

Toxicity Testing for the Grassland Bypass Project

October 1, 2001 – December 31, 2002

Ronald M. Block and Nanette Malan¹



Grassland Bypass Project

¹ President and Laboratory Manager Block Environmental Services, 2451 Estand Way, Pleasant Hill, CA 94523
Telephone: (925) 682 7200 e-mail: rblock@blockenviron.com

Introduction

The objective of the laboratory toxicity testing is to evaluate the potential toxicity of water-borne contaminants within the Grassland Bypass Project (GBP) area using standardized bioassay protocols conducted under controlled environmental conditions. The laboratory toxicity tests evaluate one species within each of three trophic levels using short-term chronic testing procedures (7 or 4 days) and lethal (survival) and non-lethal (growth or reproduction) endpoints (USEPA 1987; 1994). The test species are *Selenastrum capricornutum* (alga), *Daphnia magna* (water flea), and *Pimephales promelas* (fathead minnow).

The testing is not specific for any single chemical exposure, but rather demonstrates the net effect of only waterborne contaminant exposures in the site waters on the selected test species. During toxicity testing, test species are fed a controlled diet that is unrelated to field sources of food. For this reason, toxicity testing is not expected to detect selenium toxicity in invertebrates and fish because the main route of exposure in these groups of organisms is through the food they eat. However, selenium toxicity in algae is through direct exposure from water and thus toxicity testing may detect selenium toxicity in algae.

Tests are conducted at the screening level, comparing the ambient water to 100% test water. If significant toxicity is observed, definitive tests (dilution series) may be conducted. Water samples are collected from Stations B, C, D, and F for each monthly testing period. The Delta-Mendota Canal station is the control site. Additionally, selenium concentrations were also determined from water samples collected for each toxicity testing event by the U.S. Bureau of Reclamation (USBR) contract laboratories. However, in-situ chronic toxicity testing using caged fathead minnows has been eliminated during the course of the program, as well as measurement of selenium bioaccumulation in algae.

The toxicity program is conducted by Block Environmental Service's (BES) Bioassay Laboratory Division under the guidance of the San Luis and Delta-Mendota Water Authority. Technical assistance, quality assurance/quality control (QA/QC), and program oversight is provided by the U.S. Environmental Protection Agency (USEPA) and USBR. The toxicity program is carried out monthly.

During the past five years (Phase I; October 1996 to September 2001), the monthly collected data was used to evaluate potential adverse effects to test organisms exposed to agricultural drain water from the San Luis Drain (SLD; Site B) and Mud Slough (Site D). An evaluation was also made for Mud Slough (Site C) above the influence of the SLD and for Salt Slough (Station F), which represent the water in the Grassland wetland water supply channels.

The current phase of the Grassland Bypass Project (GBP), Phase II, was initiated in October 2001 and continues through December 31, 2009. Changes implemented for Phase II included the following: 1) No in situ water chemistries will be taken on day 0 of each testing period, and 2) No sulfate analysis will be done on any of the site samples.

In Phase II (as with Phase I), each toxicity test was performed using three separate grab samples collected on Day 0, Day 2, and Day 4 of the 7-day testing period. Site results were then compared with responses to ambient control water samples collected from the Delta Mendota Canal (DMC). The data were then used to assess contaminant exposures both temporally and spatially within the GBP area and to identify trends.

The monthly data for the fifteen-month study period ² are presented in this chapter and are compared graphically with the previous five years (Phase I).

Materials and Methods

Toxicity tests were conducted monthly on three species from three different trophic levels using the short-term chronic testing procedures, and evaluating acute and chronic endpoints (USEPA, 1987; 1994).

These tests are:

- Daphnid invertebrate (*Daphnia magna*) Short-term Acute Survival
- Fathead Minnow (*Pimephales promelas*) 7-Day Acute Larval Survival
- Daphnid invertebrate (*Daphnia magna*) Short-term Chronic Reproduction
- Fathead Minnow (*Pimephales promelas*) 7-Day Chronic Larval Growth
- Freshwater algae (*Selenastrum capricornutum*) 96-Hour Growth Test

The tests were conducted for five different sampling sites (Sites B, C, D, F and the DMC) for a total of 25 tests each month. Each test was performed using 100% sample versus the DMC ambient control except for Site B. The *Selenastrum capricornutum* growth tests also included definitive tests, using a 0.5 dilution factor. The concentration series for this test was: DMC control, 12.5%, 25%, 50%, 75% and 100% sample water.

The toxicity tests use 3 water samples collected on Day 0, Day 2 and Day 4 of the 7-day testing period. Grab samples were collected from Sites B, C, D, F, and the DMC for each monthly testing period. All toxicity test results were analyzed using the software program Toxicity Information Management System (TOXIS, Version 2.5, EcoAnalysis, Inc.). TOXIS was used to determine if there was a statistically significant reduction ($p < 0.05$) in the site test response versus the ambient control response during each monthly testing period (USEPA, 1994).

In order to assess independently the health of the test organisms and laboratory performance, a concurrent reference toxicant test was conducted for each of the test species during the monthly testing periods. The reference toxicant test was conducted using a dilution series of the toxicant in laboratory control water. The toxicity endpoints from the reference toxicant tests of each test method were plotted on a running control chart of the last 20 tests. The mean and upper and lower control limits (± 2 standard deviations) were recalculated with each successive test result. The outliers, values falling outside the upper and lower control limits, and trends of increasing or decreasing sensitivity, were identified. At the $p = 0.05$ probability level, one in 20 tests (5%) would be expected to fall outside of the control limits by chance alone.

Sub-samples of the three grab samples for each site were analyzed for selenium by the USBR contract laboratories. Other laboratory analyses (performed by BES) included conductivity, total suspended solids, dissolved oxygen (DO), pH, salinity, alkalinity, hardness, temperature, ammonia, and total chlorine.

Except as noted above, specific sampling and testing protocols for each procedure may be found in the Monitoring Program for Use and Operation of the Grassland Bypass Project, Phase II (USBR et al., June 2002) and the Quality Assurance Project Plan (USBR et. al., August 2002).

Results

Data for Phase 1 of the toxicity monitoring program may be found in the 2000 – 2001 Annual Report (USBR et. al, 2003). The results from the first fifteen months of the Second Phase of the toxicity monitoring program are presented in Tables 1 through 21. Figures 1 through 21b present the data graphically.

There were fifteen monthly laboratory toxicity test periods between October 2001 and December 2002. These results are listed in Tables 1 through 6. Tables 7 – 10 are contain summaries of occurrences of statistically significant results over the course of the project.

Water chemistry data measured in the laboratory comparing each of the stations are found in Tables 11 through 21.

Laboratory Toxicity Testing

Daphnid invertebrate (*Daphnia magna*) Short-term Acute Survival

The *Daphnia magna* short-term acute survival results are presented in Table 1 and in Figures 1, 6, 11, and 16. There were two tests with statistically significant ($p < 0.05$) reductions in survival: August 2002 (Site F) and November 2002 (Site B).

During the November 18, 2002 test, the laboratory analyses of the Site B grab sample showed elevated levels of Total Residual Chlorine (0.5 mg/L, Table 21). As a result, this sample was dechlorinated with sodium thiosulfate. A concurrent dechlorination laboratory control was also set up. Results for the dechlorinated control test showed only 30% survival, which makes these results for Site B suspect. The reduced survival may have been due to the effect of dechlorinating the sample.

All of the fifteen concurrent *Daphnia magna* reference toxicant survival endpoints were within the control chart limitations.

The DMC ambient control data met the 80% minimum survival acceptability criterion for all tests except for October 2001. The laboratory control did not meet the survival acceptability criterion for January and May.

Fathead Minnow (*Pimephales promelas*) 7-Day Acute Larval Survival

The *Pimephales promelas* 7-day acute larval survival results are presented in Table 2 and in Figures 2, 7, 12, and 17. Six tests showed a statistically significant ($p < 0.05$) reduction in larval fathead minnow survival when compared to the DMC ambient control water. This reduced survival was consistently observed during four months: November 2001 (Site D), December 2001 (Sites C and D), November 2002 (Site C and F), and December 2002 (Site D).

The survival data for the *Pimephales promelas* larvae indicate an adverse effect for Sites C, D, and F between November and December of each year. Site D had the greatest effect in

total number of occurrences (3 events). All statistically significant tests occurred during the winter months, which is usually the wet season. Each concurrent *Pimephales promelas* reference toxicant survival endpoint was within the control chart limits.

Data for the DMC ambient control and the laboratory control met the minimum 80% acceptability criteria for all 15 sampling events.

***Daphnia magna* Short-Term Chronic Reproduction**

The *Daphnia magna* short-term chronic reproduction results are presented in Table 3 and in Figures 3, 8, 13, and 18. Three tests showed statistically significant ($p < 0.05$) reduced reproduction for February (Site B), June (Site F) and November 2002 (Site B). The November 2002 Site B reduction may have been the result of the dechlorination of the sample. This is supported by reduced reproduction in the concurrent dechlorinated laboratory control.

All of the concurrent *Daphnia magna* reference toxicant reproduction endpoints were within the control chart limitations.

The DMC ambient control data met the 10 neonates/surviving female minimum reproduction acceptability criterion in all fifteen tests. The laboratory control met the reproduction acceptability criterion in all but one of the fifteen tests (May, 2002).

Fathead Minnow (*Pimephales promelas*) 7-Day Chronic Larval Growth

The *Pimephales promelas* 7-day chronic larval growth results are presented in Table 4 and in Figures 4, 9, 14, and 19. A Statistically significant ($p < 0.05$) reduced rate of growth was observed in five tests: December 2001 (Site C), August 2002 (Site B), November 2002 (Sites C), and December 2002 (Sites C and D). A significantly ($p < 0.05$) increased rate of growth was observed for site F (November 2002) when compared to the DMC ambient control. Each concurrent *Pimephales promelas* reference toxicant growth endpoint was within the control chart limits. All data for the DMC ambient control and the laboratory control met the 0.25mg/surviving adult minimum growth acceptability criterion as shown in Table 4.

Freshwater Alga (*Selenastrum capricornutum*) 96-Hour Growth Test

The freshwater algal 96-hour growth test results are presented in Table 5 and in Figures 5, 10, 15, and 20. Seventeen tests produced statistically significant ($p < 0.05$) reductions in algal growth. The reduced growth was observed during the November 2001 (Site B), December 2001 (Site B), January (Site B), February (Sites B, D and F), March (Sites B, C and D), April (Sites B and D), June (Site B, D and F), and October 2002 (Sites C, D and F) tests.

Site B had the highest number of statistically significant test results, 7, from November through April and again in June. These results are similar to previous years, wherein Site B had the highest number of statistically significant test results, usually during the winter months.

There are no results for August 2002 as the laboratory stock culture did not survive the 96-hour testing period.

All concurrent *S. capricornutum* reference toxicant growth endpoints were within the control chart limitations.

Both the DMC and Lab control failed to meet the minimum growth acceptability criterion during November 2001, December 2001, April 2002, May 2002 and December 2002. The DMC control also failed the minimum variance criterion of < 20 percent in December 2002. These results are summarized in Table 5.

Definitive Bioassay Testing

Definitive bioassay tests were conducted on with Site B water samples during all fifteen months of the study period (Table 6). The definitive bioassay used a dilution series of the site water at 12.5, 25, 50, 75, and 100 percent of the site water diluted with water from the DMC (ambient water). The results were compared to the DMC water. Laboratory control water was used as a second control for possible toxicity in the DMC water.

The definitive bioassay method allowed for the determination of the No Observed Effect Concentration (NOEC). The NOEC is a statistically derived calculation of the amount of the test water dilution needed to eliminate those adverse effects that are measured by these tests. For example, in January 2002, the NOEC was 25 (Table 6). This means that in order that a test endpoint not to differ statistically from the control, sample water must be a diluted to 25 percent with 75 percent of ambient water.

Results from the fifteen monthly tests for the study period (Table 6) showed that four samples did not exhibit toxicity (NOEC > 100%) at full-strength test water (October 2001, July 2002, October 2002, and December 2002), two samples had NOECs of 75 percent (November 2001 and September 2002), three samples had NOECs of fifty percent (December 2001, April 2002, and May 2002), two samples had NOECs of 25 percent (January 2002 and November 2002), and three samples had NOECs of 12.5 percent or less (February 2002, March 2002, and June 2002). The NOEC was not calculable for August 2002.

These data also can be expressed in toxicity units, where:

$$\text{Toxicity Unit (TU)} = 100/\text{NOEC}$$

In general, toxicity units are used to standardize the results of toxicity tests regardless of the statistical endpoint used. In the example given above for January 2002, the NOEC was 25, which is equivalent to four TU. A compilation of data for 30 months in which there was definitive testing of algae is listed in Table 6. Two months' results showed toxicity units of greater than sixteen (December 1999, September 2000). During these months, the Site B water would have had to have been diluted more than sixteen times to eliminate those toxic effects. Toxicity units were greater than or equal to eight in samples collected June 2000, February 2002, and March 2002; equal to 4 for two months and equal to 2 for three months. On the other hand, twelve of the thirty tests resulted in toxicity units equal to or less than one.

Water Chemistry

Selenium

The selenium data are presented in Table 11 and Figures 21a and 21b. Site B had the highest selenium concentrations for the entire water year, with the months of April, October 2002, November 2002 and December 2002 having the highest concentrations (ranging between 52-78 µg/L). The July and August 2002 sampling events had the lowest selenium concentrations, ranging from of 28 to 45 µg/L. Site D showed the same seasonal trends as Site B

although concentrations were 50-70% lower than Site B for the period October 2001 through March 2002. For the period beginning in April 2002 and continuing through August 2002, the selenium concentrations measured at Site D were similar to those observed from Site B.

Sulfate

Sulfate was not analyzed in water samples collected during the fifteen-month study period.

Other Water Chemistry

The laboratory water chemistry data are presented in Tables 12 through 21. All analyses were performed at the BES Laboratory, except for selenium.

The conductivity was higher for Site B water for all months except for the first sampling event in March and April 2002. Site C and F had the lowest conductivity (Table 12). The DO and pH of all sites were similar, with Site F showing the lowest pH on average (Tables 14 and 15). The Site B water is about two to three times greater in hardness than the other sites, exceeding 1000 mg/L (as CaCO₃) during October through December 2001, January and September through December 2002 (Table 18). Total suspended solids were generally higher in Site C and F water and lowest in Site B water. Suspended solids remain higher from March through October at Sites C, D and F (Table 13). No trend in alkalinity was observed. In January 2002 Sites D and F had elevated levels of alkalinity and in March Sites C and D had elevated levels (Table 17). The highest ammonia nitrogen concentration was observed in October 2001 at Site B (3.80 mg/L) (Table 20). The total chlorine concentration ranged from non-detectable to 2.50 mg/L. Site B had the highest chlorine concentration in August 2002 (2.50 mg/L) (Table 21).

Conclusions

A total of 180 laboratory toxicity tests (four sites, 15 months with three species) comparing the Site waters (B, C, D, and F) with the ambient control (Delta Mendota Canal) were conducted between October 2001 and December 2002 using three species short-term acute and chronic tests. Each set of tests included five toxicity endpoints (fish survival and growth, water flea survival and reproduction, and algae growth). Of these tests, 34 endpoints (Site B = 11, Site C = 7, Site D = 9, and Site F = 7) of the 300 possible (11.3 %) exhibited statistically significant reduced endpoints ($P < 0.05$) compared to the ambient control tests.

Daphnia magna was the least sensitive of the species tested with 2 significant responses for reproduction and 3 for survival.

The freshwater alga was the most sensitive species tested. The algae exposed to Site B water exhibited reduced growth when compared to DMC ambient control water in 7 out of 15 months. As a whole, 17 of 56 tests demonstrated a significant reduction in algal growth. Definitive testing was initiated in November 1999 for Site B to evaluate the No Observed Effect Concentration (NOEC) for Site B test water when compared to ambient water. Of the 14 tests conducted during the fifteen month study period, 4 samples had NOECs greater than 100, 2 samples had NOECs at 75 percent (November 2001 and September 2002), 3 samples at 50 percent (December 2001, April and May 2002), 2 samples at 25 percent (January 2002 and November 2002), 1 sample at 12.5 percent (June 2002) and 2 samples (February and March

2002) had NOECs less than 12.5 percent, as shown Table 12. The August results are not included, as the test was not valid.

The larval *Pimephales promelas* accounted for 12 statistically significant responses for survival and growth. The majority of these responses were during the winter months (November through January) at Sites C, D, and F.

All statistically significant events are summarized in the Tables 7 through 10.

References

- U.S. Bureau of Reclamation, et. al. August 2002. Quality Assurance Project Plan for the Compliance Monitoring Program for Use and Operation of the Grassland Bypass Project. U.S. Bureau of Reclamation, Mid-Pacific Region, Sacramento, CA. June 20, 1997.
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- U.S. Environmental Protection Agency. 1994. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms. EPA-600/4-91-002. July 1994, Third Edition. Office of Research and Development.
- U.S. Environmental Protection Agency. 1987. A Short-term Chronic Toxicity Test Using *Daphnia magna*. EPA/600/D-87/080. March, 1987. Office of Research and Development.

Table 1. Daphnid invertebrate (*Daphnia magna*) Short-term Acute Survival

Units	Site B Percent	Site C Percent	Site D Percent	Site F Percent	Ambient (DMC) Percent	Laboratory Control Percent
Oct-01	90	100	90	90	70**	90
Nov-01	100	89	90	100	80	90
Dec-01	90	100	90	90	100	100
Jan-02	100	90	80	100	100	67**
Feb-02	100	80	90	90	100	100
Mar-02	90	100	100	100	90	100
Apr-02	100	90	100	90	100	100
May-02	80	100	80	100	89	30**
Jun-02	100	90	90	90	100	90
Jul-02	90	100	100	100	100	100
Aug-02	100	90	100	60*	100	90
Sep-02	90	100	90	100	90	90
Oct-02	100	89	90	100	100	89
Nov-02	60***	100	100	100	100	100
Dec-02	100	100	100	90	100	90
Figure:	1	6	11	16		

Notes: No statistics were computed between sampling dates.

* Statistically significant event (P<0.05). Statistics were computed between all site means and the DMC ambient water sample.

** DMC/Lab water failed to meet the survival ($\geq 80\%$) acceptability criteria.

*** Sample was dechlorinated. Dechlorinated lab control was 30 percent survival. This result is suspect

Table 2. Fathead Minnow (*Pimephales promelas*) 7-Day Acute Larval Survival

Units:	Site B (Percent + Standard Deviation)	Site C (Percent + Standard Deviation)	Site D (Percent + Standard Deviation)	Site F (Percent + Standard Deviation)	Ambient (DMC) (Percent + Standard Deviation)	Laboratory Control (Percent + Standard Deviation)
Oct-01	100 + 0.0	98 + 5.0	100 + 0.0	100 + 0.0	100 + 0.0	100 + 0.0
Nov-01	98 + 5.0	83 + 28.7	60* + 21.60	88 + 25.0	100 + 0.0	100 + 0.0
Dec-01	98 + 5.0	55* + 33.2	68* + 5.0	90 + 8.2	98 + 5.2	100 + 0.0
Jan-02	83 + 15.0	95 + 5.8	98 + 5.0	100 + 0.0	100 + 0.0	98 + 5.0
Feb-02	93 + 5.0	90 + 11.5	93 + 5.8	95 + 5.8	93 + 5.0	100 + 0.0
Mar-02	98 + 5.0	90 + 0	98 + 5.0	80 + 14.1	88 + 12.6	98 + 5.0
Apr-02	93 + 5.0	93 + 5.0	85 + 10.0	95 + 5.8	95 + 5.8	98 + 5.0
May-02	98 + 5.0	95 + 5.8	95 + 10.0	90 + 11.5	85 + 17.3	88 + 18.9
Jun-02	98 + 5.0	100 + 0	100 + 0.0	95 + 5.8	95 + 5.8	100 + 0.0
Jul-02	100 + 0.0	95 + 5.8	98 + 5.0	93 + 5.0	90 + 14.1	100 + 0.0
Aug-02	85 + 10.0	88 + 5.0	95 + 10.0	90 + 8.2	95 + 10.0	98 + 5.0
Sep-02	100 + 0.0	98 + 5.0	98 + 5.0	95 + 5.8	95 + 5.8	93 + 9.6
Oct-02	93 + 5.0	98 + 5.0	100 + 0.0	93 + 9.6	98 + 5.0	100 + 0.0
Nov-02	98 + 5.0	55* + 26.5	83 + 17.1	65* + 28.9	100 + 0.0	100 + 0.0
Dec-02	100 + 0.0	88 + 0.1	78* + 0.1	98 + 0.1	98 + 5.0	100 + 0.0
Figure:	4	9	14	19		

Notes: No statistics were computed between sampling dates.

* Statistically significant event (P=0.05). Statistics were computed between all site means and the DMC ambient water sample.

Table 3. Daphnid invertebrate (*Daphnia magna*) Short-term Chronic Reproduction

Units:	Site B Number of Neonates per Female + Standard Deviation	Site C Number of Neonates per Female + Standard Deviation	Site D Number of Neonates per Female + Standard Deviation	Site F Number of Neonates per Female + Standard Deviation	Ambient (DMC) Number of Neonates per Female + Standard Deviation	Laboratory Control Number of Neonates per Female + Standard Deviation
Oct-01	39.50 + 16.11	39.10 + 8.49	29.80 + 18.03	35.30 + 13.34	21.10 + 15.55	31.70 + 12.34
Nov-01	27.40 + 4.81	28.22 + 13.72	34.20 + 7.22	33.40 + 7.31	25.40 + 10.01	29.60 + 11.42
Dec-01	41.30 + 16.20	45.90 + 11.21	43.30 + 18.40	42.40 + 19.25	45.10 + 10.04	36.70 + 13.61
Jan-02	29.40 + 7.46	29.30 + 12.51	23.60 + 14.71	30.50 + 3.81	30.10 + 4.43	11.89 + 9.47
Feb-02	42.80* + 4.42	37.70 + 20.51	42.00 + 15.37	40.60 + 18.47	47.40 + 7.03	32.40 + 14.62
Mar-02	47.20 + 17.89	47.70 + 11.24	49.80 + 20.94	45.80 + 10.01	54.50 + 27.09	50.20 + 18.46
Apr-02	56.20 + 13.32	43.40 + 18.24	59.80 + 12.02	49.30 + 18.78	49.50 + 6.85	47.33 + 11.84
May-02	26.40 + 16.72	36.50 + 8.62	30.70 + 17.56	37.20 + 9.37	27.89 + 14.69	2.90** + 4.73
Jun-02	40.00 + 11.69	36.10 + 19.79	43.10 + 20.22	24.30* + 13.98	45.30 + 11.34	28.60 + 19.94
Jul-02	28.30 + 17.83	29.70 + 15.28	34.56 + 13.85	29.60 + 15.38	33.10 + 5.30	29.10 + 14.69
Aug-02	40.80 + 13.16	26.60 + 13.40	34.10 + 16.19	20.40 + 22.46	25.60 + 15.21	22.90 + 14.72
Sep-02	24.40 + 17.08	28.00 + 9.20	28.70 + 12.93	31.10 + 14.38	23.70 + 13.45	23.70 + 13.45
Oct-02	40.40 + 17.40	30.22 + 22.44	29.60 + 17.99	27.90 + 9.36	29.90 + 12.24	21.11 + 14.02
Nov-02	7.90*/*/* + 7.42	30.30 + 13.86	33.50 + 10.32	29.30 + 11.85	18.40 + 18.11	20.30 + 14.67
Dec-02	22.80 + 6.34	26.30 + 6.75	36.70 + 13.27	29.90 + 19.89	26.70 + 15.0	21.40 + 13.33
Figure	3	8	13	18		

Notes:	No statistics were computed between sampling dates.
*	Statistically significant event (P=0.05). Statistics were computed between all site means and the DMC ambient water sample.
**	DMC/Lab water failed to meet the reproduction (≥ 10) acceptability criteria.
***	Sample was dechlorinated. Dechlorinated lab control ws 30 percent survival. This result is suspect

Table 4. Fathead Minnow (*Pimephales promelas*) 7-Day Chronic Larval Growth

Units:	Site B (In Milligrams + Standard Deviation)	Site C (In Milligrams + Standard Deviation)	Site D (In Milligrams + Standard Deviation)	Site F (In Milligrams + Standard Deviation)	Ambient (DMC) (In Milligrams + Standard Deviation)	Laboratory Control (In Milligrams + Standard Deviation)
Oct-01	0.63 + 0.04	0.71 + 0.11	0.78 + 0.07	0.65 + 0.02	0.66 + 0.04	0.58 + 0.02
Nov-01	0.70 + 0.02	0.49 + 0.18	0.49 + 0.16	0.59 + 0.14	0.67 + 0.05	0.52 + 0.04
Dec-01	0.48 + 0.04	0.34* + 0.15	0.41 + 0.03	0.55 + 0.04	0.47 + 0.05	0.50 + 0.03
Jan-02	0.39 + 0.03	0.41 + 0.02	0.44 + 0.05	0.51 + 0.06	0.44 + 0.03	0.40 + 0.05
Feb-02	0.55 + 0.04	0.47 + 0.07	0.58 + 0.11	0.55 + 0.11	0.52 + 0.06	0.42 + 0.02
Mar-02	0.40 + 0.04	0.47 + 0.04	0.50 + 0.03	0.41 + 0.15	0.43 + 0.09	0.48 + 0.03
Apr-02	0.64 + 0.04	0.63 + 0.10	0.50 + 0.09	0.63 + 0.01	0.55 + 0.03	0.58 + 0.04
May-02	0.63 + 0.04	0.70 + 0.30	0.62 + 0.14	0.65 + 0.10	0.61 + 0.12	0.56 + 0.28
Jun-02	0.38 + 0.07	0.43 + 0.08	0.41 + 0.03	0.42 + 0.04	0.31 + 0.03	0.50 + 0.04
Jul-02	0.31 + 0.02	0.33 + 0.03	0.34 + 0.05	0.35 + 0.03	0.31 + 0.05	0.34 + 0.04
Aug-02	0.49* + 0.04	0.49 + 5.50	0.58 + 5.0	0.59 + 0.14	0.57 + 0.07	0.55 + 0.06
Sep-02	0.38 + 0.01	0.38 + 0.04	0.29 + 0.05	0.33 + 0.07	0.31 + 0.07	0.30 + 0.01
Oct-02	0.66 + 0.10	0.66 + 0.06	0.71 + 0.14	0.62 + 0.06	0.67 + 0.07	0.61 + 0.09
Nov-02	0.41 + 0.05	0.22* + 0.14	0.40 + 0.03	0.72* + 0.10	0.38 + 0.06	0.33 + 0.08
Dec-02	0.55 + 0.04	0.48* + 0.07	0.49* + 0.08	0.60 + 0.06	0.57 + 0.03	0.52 + 0.06
Figure	4	9	14	19		

Notes:	No statistics were computed between sampling dates.
*	Statistically significant event (P=0.05). Statistics were computed between all site means and the DMC ambient water sample.

Table 5. Freshwater Algae (*Selenastrum capricornutum*) 96-hour Growth Test

	Site B		Site C		Site D		Site F		Ambient (DMC)		Lab Control	
	Cells	Variance	Cells	Variance	Cells	Variance	Cells	Variance	Cells	Variance	Cells	Variance
	cells/mL	%	cells/mL	%	cells/mL	%	cells/mL	%	cells/mL	%	cells/mL	%
Oct-01	9.1	16.4	10.73	5.9	11.29	4.3	11.37	10.6	10.29	13.2	9.30	10.9
Nov-01	6.04*	17.2	11.14	17.2	11.03	24.8	9.98	15.2	9.21**	16.9	6.35**	6.1
Dec-01	7.48*	12.7	9.41	10.8	9.59	6.3	9.34	11.9	8.87**	11.0	9.08**	7.5
Jan-02	6.62*	12.7	19.21	4.3	17.35	10.3	24.67	10.8	15.14	24.7	10.08	16.4
Feb-02	8.7*	11.3	17.28	27.7	14.93*	8.4	12.68*	11.9	18.21	12.7	12.58	7.4
Mar-02	8.7*	10.7	14.24*	10.2	12.88*	13.2	18.24	11.8	17.77	18.3	13.50	10.9
Apr-02	1.44*	14.4	6.96	6.9	4.37*	15.2	6.56	13.8	5.80**	13.5	6.90**	3.2
May-02	4.77	28.1	7.93	21.1	6.13	8.2	6.26	9.7	7.10**	7.0	3.78**	9.2
Jun-02	6.39*	15.8	9.47	27.0	7.65*	21.3	6.8*	24.0	11.73	8.2	10.21	16.3
Jul-02	5.98	28.5	10.16	8.4	10.34	24.2	10.51	15.0	6.77	11.4	8.71	9.6
Aug-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sep-02	10.93	2.3	8.15	0.9	7.40	1.8	7.60	2.6	11.90	1.2	11.97	
Oct-02	8.87	1.5	5.94*	1.0	6.37*	0.7	6.43*	4.2	7.84	4.0	9.53	11.3
Nov-02	10.76	1.3	15.71	0.4	11.19	4.3	10.81	2.0	15.66	1.0	14.20	0.8
Dec-02	7.34	30.9	9.67	21.0	9.99	15.3	6.84	23.4	2.44***	25.3	7.67**	13.6

Figure 5 10 15 20

Notes: Cell count values expressed as the exponent 10^5 .

Selenate added

No statistics were computed between sampling dates.

* Statistically significant event ($p < 0.05$). Statistics were computed between all site means and the DMC ambient water sample.

** DMC/Control water failed to meet the growth ($\geq 1 \times 10^6$) acceptability criteria.

*** DMC/Control water failed to meet the variance ($\leq 20\%$) acceptability criteria.

NA Not available

Table 6. Statistical Analysis of Growth Endpoints for Algae at Site B

Test Month	IC 50	IC 25	NOEC	LOEC	Toxic Units
Feb-1998	79.16	46.85	>100	>100	<1
Mar-1998	83.62	58.83	50.00	100.00	2
Apr-1998	>100	31.67	25.00	50.00	4
Oct-1999	NA	NA	NA	NA	NA
Nov-1999	>100	87.45	50.00	100.00	2
Dec-1999	>100	54.44	<6.25	6.25	>16
Jan-2000	72.98	38.58	25.00	50.00	4
Feb-2000	>100	36.68	25.00	50.00	4
Mar-2000	>100	100.00	>100	>100	<1
Apr-2000	>100	>100	>100	>100	<1
May-2000	>100	>100	>100	>100	<1
Jun-2000	>100	>100	12.50	25.00	8
Jul-2000	>100	>100	>100	>100	<1
Aug-2000	>100	>100	>100	>100	<1
Sep-2000	NA	NA	<6.25	6.25	>16
Oct-2001	>100	>100	>100	>100	<1
Nov-2001	>100	85.95	75.00	100.00	1
Dec-2001	>100	73.72	50.00	75.00	2
Jan-2002	81.91	48.92	25.00	50.00	4
Feb-2002	95.22	19.71	<12.5	12.50	>8
Mar-2002	98.48	56.23	<12.5	12.50	>8
Apr-2002	78.73	56.82	50.00	75.00	2
May-2002	>100	69.94	50.00	75.00	2
Jun-2002	81.13	32.71	12.50	25.00	8
Jul-2002	>100	>100	>100	>100	<1
Aug-2002	NA	NA	NA	NA	NA
Sep-2002	>100	>100	75.00	100.00	1
Oct-2002	>100	>100	>100	>100	<1
Nov-2002	>100	48.34	25.00	50.00	4
Dec-2002	>100	>100	>100	>100	<1

Data Source: Block Environmental Services

Notes:

NA - Not available

Table 7. Summary of Statistically Significant Results - Site B**Table 7a. *Daphnia magna* Short-term Acute Survival**

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998															
1999															
2000															
2001								*	*		*				
2002+														*	

Table 7b. *Pimephales promelas* 7-day Acute Larval Survival

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998															
1999															
2000															
2001															
2002+															

Table 7c. *Daphnia magna* Short-term Chronic Reproduction

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998				*											
1999	*														
2000															
2001								*	*		*				
2002+					*									*	

Table 7d. *Pimephales promelas* 7-day Chronic Larval Growth

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997					*										
1998	*	*													
1999															
2000															
2001					*				*						
2002+											*				

Table 7e. Freshwater Algae (*Selenastrum capricornutum*) 96-hour Growth Test

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997			*		*	*	*		*			*			
1998	*		*	*	*	*		*	*			*			
1999	*	*	*	*	*						*				
2000		*	*	*	*										
2001			*		*			*	*		*	*			
2002+		*	*	*	*	*	*		*		na				

* Statistically significant event ($p < 0.05$). Statistics were computed between all site means and the DMC ambient water sample.

Table 8. Summary of Statistically Significant Results - Site C**Table 8a. *Daphnia magna* Short-term Acute Survival**

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998															
1999															
2000															
2001				*					*						
2002+															

Table 8b. *Pimephales promelas* 7-day Acute Larval Survival

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997			*		*										
1998		*	*	*	*	*									
1999	*	*	*	*	*	*									
2000		*	*	*	*	*									
2001	*	*	*	*	*	*									
2002+			*											*	

Table 8c. *Daphnia magna* Short-term Chronic Reproduction

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998															
1999															
2000															
2001									*						
2002+															

Table 8d. *Pimephales promelas* 7-day Chronic Larval Growth

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997										*					
1998	*	*	*	*	*	*					*				
1999	*	*	*	*	*	*					*				
2000		*	*	*	*	*									
2001	*	*	*	*	*	*									
2002+			*											*	*

Table 8e. Freshwater Algae (*Selenastrum capricornutum*) 96-hour Growth Test

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997					*		*	*							
1998															
1999						*	*								
2000															
2001									*						
2002+						*					na		*		

* Statistically significant event ($p < 0.05$). Statistics were computed between all site means and the DMC ambient water sample.

Table 9. Summary of Statistically Significant Results - Site D**Table 9a. *Daphnia magna* Short-term Acute Survival**

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998															
1999															
2000															
2001	*								*	*	*				
2002+															

Table 9b. *Pimephales promelas* 7-day Acute Larval Survival

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997			*												
1998			*	*	*	*									
1999		*	*	*	*										
2000		*	*	*	*										
2001		*	*	*	*										
2002+		*	*												*

Table 9c. *Daphnia magna* Short-term Chronic Reproduction

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998				*											
1999	*														
2000															
2001									*		*				
2002+															

Table 9d. *Pimephales promelas* 7-day Chronic Larval Growth

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	*														
1998	*			*	*	*									
1999		*													
2000		*													
2001	*	*	*												
2002+															*

Table 9e. Freshwater Algae (*Selenastrum capricornutum*) 96-hour Growth Test

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997			*		*	*		*				*			
1998															
1999		*			*										
2000	*	*													
2001									*		*				
2002+					*	*	*		*		na		*		

* Statistically significant event ($p < 0.05$). Statistics were computed between all site means and the DMC ambient water sample.

Table 10. Summary of Statistically Significant Results - Site F**Table 10a. *Daphnia magna* Short-term Acute Survival**

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998															
1999															
2000															
2001															
2002+											*				

Table 10b. *Pimephales promelas* 7-day Acute Larval Survival

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998	*				*	*			*						
1999		*		*											
2000	*	*	*	*	*										
2001		*													
2002+														*	

Table 10c. *Daphnia magna* Short-term Chronic Reproduction

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998				*	*										
1999															
2000															
2001															
2002+									*						

Table 10d. *Pimephales promelas* 7-day Chronic Larval Growth

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997															
1998	*	*			*	*			*						
1999		*		*							*				
2000		*	*	*	*										
2001		*													
2002+														*	

Table 10e. Freshwater Algae (*Selenastrum capricornutum*) 96-hour Growth Test

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997						*	*	*							
1998															
1999			*	*	*										
2000					*										
2001					*		*		*						
2002+					*				*		na		*		

* Statistically significant event ($p < 0.05$). Statistics were computed between all site means and the DMC ambient water sample.

Table 11. Selenium (µg/L) as Measured by the Bureau of Reclamation

SAMPLE DATE	Site B	Site C	Site D	Site F	Delta-Mendota Canal
22-Oct-01	53	<0.4	7.3	<0.4	<0.4
24-Oct-01	51	0.4	7.8	<0.4	<0.4
26-Oct-01	30	<0.4	5.2	<0.4	<0.4
26-Nov-01	44	<0.4	6.0	<0.4	<0.4
28-Nov-01	47	<0.4	5.2	<0.4	<0.4
30-Nov-01	49	<0.4	6.2	<0.4	0.5
10-Dec-01	55	<0.4	8.2	<0.4	<0.4
12-Dec-01	45	<0.4	7.4	<0.4	<0.4
14-Dec-01	47	<0.4	8.4	<0.4	<0.4
28-Jan-02	61	<0.4	13.0	<0.4	<0.4
30-Jan-02	56	<0.4	14.0	0.8	<0.4
1-Feb-02	66	<0.4	13.0	0.5	<0.4
18-Feb-02	61	0.7	20.0	0.9	1.3
20-Feb-02	65	0.7	20.0	1.0	1.2
22-Feb-02	70	0.8	22.0	0.9	1.0
25-Mar-02	78	<0.4	24.0	0.4	1.7
27-Mar-02	77	<0.4	27.0	0.6	<0.4
29-Mar-02	81	<0.4	26.0	<0.4	<0.4
22-Apr-02	62	0.6	52.0	0.7	0.4
24-Apr-02	78	0.8	37.0	0.8	0.4
26-Apr-02	70	0.7	48.0	0.7	<0.4
20-May-02	52	0.7	38.0	0.5	<0.4
22-May-02	34	0.6	25.0	0.5	<0.4
24-May-02	46	0.8	27.0	0.5	<0.4
24-Jun-02	48	0.9	29.0	0.5	<0.4
26-Jun-02	48	0.8	38.0	0.7	<0.4
28-Jun-02	52	0.5	50.0	0.7	0.5
22-Jul-02	30	0.5	22.0	0.5	0.5
24-Jul-02	32	0.8	17.0	0.4	<0.4
26-Jul-02	32	0.9	20.0	<0.4	<0.4
19-Aug-02	28	0.7	21.0	0.5	<0.4
21-Aug-02	34	0.7	26.0	0.6	<0.4
23-Aug-02	45	0.7	26.0	0.5	<0.4
23-Sep-02	48	0.5	15.0	0.5	<0.4
25-Sep-02	44	0.5	11.0	<0.4	<0.4
27-Sep-02	48	<0.4	18.0	0.4	<0.4
14-Oct-02	75	0.4	15.0	<0.4	<0.4
16-Oct-02	52	<0.4	7.0	<0.4	<0.4
18-Oct-02	57	<0.4	10.0	<0.4	<0.4
18-Nov-02	55	0.5	7.6	<0.4	<0.4
20-Nov-02	67	0.4	7.6	0.5	<0.4
22-Nov-02	68	0.4	6.5	<0.4	<0.4
16-Dec-02	78	0.4	12.0	0.8	0.6
17-Dec-02	72	<0.4	8.0	0.8	0.6
20-Dec-02	70	<0.4	10.0	0.7	1.0

Data Source: Analysis conducted by SDSU Olson Laboratory for the US Bureau of Reclamation

Table 12: Conductivity (μ S) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				Delta-Mendota Canal
		Site B	Site C	Site D	Site F	
Oct-01	22-Oct-01	3,241	900	1,274	1,200	484
	24-Oct-01	2,916	951	1,274	1,030	467
	26-Oct-01	2,965	1,125	1,189	1,219	497
Nov-01	26-Nov-01	2,906	1,104	1,302	1,098	451
	28-Nov-01	2,758	1,042	1,263	1,024	373
	30-Nov-01	2,820	1,030	1,268	920	531
	10-Dec-01	2,860	1,132	1,430	1,001	381
Dec-01	12-Dec-01	2,930	1,115	1,456	1,009	402
	14-Dec-01	2,929	1,321	1,645	1,278	381
	28-Jan-02	476	233	195	289	290
Jan-02	30-Jan-02	3,462	3,330	2,076	1,502	296
	1-Feb-02	4,928	1,547	3,005	1,293	358
	18-Feb-02	4,458	2,323	3,080	1,570	960
Feb-02	20-Feb-02	3,438	2,351	3,188	1,033	870
	22-Feb-02	4,763	2,265	3,170	772	473
	25-Mar-02	3,237	2,880	3,650	1,272	760
Mar-02	27-Mar-02	4,025	2,730	3,647	385	388
	29-Mar-02	3,658	2,678	3,480	NA	238
	22-Apr-02	2,884	1,686	1,062	3,116	361
Apr-02	24-Apr-02	3,460	987	2,277	1,174	315
	26-Apr-02	3,520	1,216	2,072	1,157	268
	20-May-02	3,396	1,507	1,315	756	8
May-02	22-May-02	2,664	1,192	2,441	714	8
	24-May-02	3,285	1,141	2,385	866	8
	24-Jun-02	3,710	960	2,791	978	283
Jun-02	26-Jun-02	3,456	1,058	2,720	831	265
	28-Jun-02	3,409	1,927	3,221	833	239
	22-Jul-02	2,895	653	2,104	753	279
Jul-02	24-Jul-02	3,127	758	1,914	790	297
	26-Jul-02	3,313	822	2,320	822	274
	19-Aug-02	2,275	686	1,620	697	346
Aug-02	21-Aug-02	2,579	790	1,935	849	400
	23-Aug-02	2,436	734	1,901	821	359
	23-Sep-02	3,183	821	1,621	1,013	561
Sep-02	25-Sep-02	2,727	616	1,208	971	437
	27-Sep-02	2,985	759	1,591	983	532
	14-Oct-02	4,225	888	1,776	1,057	461
Oct-02	16-Oct-02	3,212	740	1,018	1,137	442
	18-Oct-02	3,215	756	1,036	1,073	445
	18-Nov-02	2,496	1,210	1,216	844	426
Nov-02	20-Nov-02	2,871	1,021	1,246	921	360
	22-Nov-02	2,589	1,232	1,239	893	378
	16-Dec-02	2,823	1,084	1,426	730	377
Dec-02	17-Dec-02	3,408	1,238	1,540	1,000	507
	20-Dec-02	3,059	1,091	1,413	934	637

NA-Not Available

Table 13: Total Suspended Solids (mg/L) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				
		Site B	Site C	Site D	Site F	Delta-Mendota Canal
Oct-01	20-Oct-01	44	16	11	52	4
	22-Oct-01	54	28	21	65	11
	24-Oct-01	55	8	32	126	5
	26-Nov-01	45	39	20	57	11
Nov-01	28-Nov-01	62	21	28	NA	16
	30-Nov-01	57	29	53	101	23
	10-Dec-01	32	18	15	49	74
Dec-01	12-Dec-01	40	8	13	48	28
	14-Dec-01	58	23	43	57	12
	28-Jan-02	55	23	26	74	52
Jan-02	30-Jan-02	58	22	26	43	40
	1-Feb-02	74	19	28	101	29
	18-Feb-02	52	36	73	101	29
Feb-02	20-Feb-02	34	48	40	81	40
	22-Feb-02	74	54	47	120	50
	25-Mar-02	40	94	56	46	16
Mar-02	27-Mar-02	38	108	80	75	27
	29-Mar-02	61	163	118	64	34
	22-Apr-02	59	45	85	129	129
Apr-02	24-Apr-02	45	82	82	104	104
	26-Apr-02	31	127	93	198	198
	20-May-02	42	52	48	139	139
May-02	22-May-02	47	79	84	138	138
	24-May-02	43	55	54	148	148
	24-Jun-02	52	36	46	119	119
Jun-02	26-Jun-02	69	81	82	168	168
	28-Jun-02	57	34	47	159	159
	22-Jul-02	44	172	139	181	181
Jul-02	24-Jul-02	55	167	147	210	210
	26-Jul-02	91	254	NA	153	153
	19-Aug-02	NA	NA	NA	NA	NA
Aug-02	21-Aug-02	58	135	86	146	146
	23-Aug-02	61	79	71	155	155
	23-Sep-02	55	76	72	38	38
Sep-02	25-Sep-02	66	52	69	168	168
	27-Sep-02	70	111	69	148	148
	14-Oct-02	45	69	71	130	14
Oct-02	16-Oct-02	59	93	67	197	29
	18-Oct-02	56	44	58	72	24
	18-Nov-02	55	23	35	60	12
Nov-02	20-Nov-02	82	26	34	94	17
	22-Nov-02	67	43	43	119	24
	16-Dec-02	68	69	82	69	26
Dec-02	17-Dec-02	63	23	24	85	54
	20-Dec-02	80	36	41	58	18

NA-Not Available

Table 14: Dissolved Oxygen (mg/L) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				
		Site B	Site C	Site D	Site F	Delta-Mendota Canal
Oct-01	22-Oct-01	12.4	7.1	7.1	9.0	9.4
	24-Oct-01	11.5	10.3	8.4	8.4	9.0
	26-Oct-01	12.1	8.2	8.5	8.7	9.8
Nov-01	26-Nov-01	10.7	10.7	10.4	10.2	10.1
	28-Nov-01	10.8	11.5	11.3	11.0	11.2
	30-Nov-01	11.4	11.0	11.0	10.9	10.8
Dec-01	10-Dec-01	11.6	11.1	11.0	10.7	10.6
	12-Dec-01	11.5	10.5	10.9	10.6	10.6
	14-Dec-01	10.7	9.8	9.5	8.7	9.5
Jan-02	28-Jan-02	7.9	10.2	9.2	8.7	11.3
	30-Jan-02	12.3	12.7	12.1	11.5	11.5
	1-Feb-02	11.7	10.1	11.5	11.2	10.6
Feb-02	18-Feb-02	10.5	9.7	10.2	8.6	11.0
	20-Feb-02	12.0	9.9	10.7	9.4	10.4
	22-Feb-02	11.9	9.2	9.8	10.3	9.4
Mar-02	25-Mar-02	12.6	11.7	10.9	11.2	10.0
	27-Mar-02	12.1	10.6	10.4	10.7	10.5
	29-Mar-02	10.5	7.1	8.1	NA	8.6
Apr-02	22-Apr-02	11.6	9.9	8.0	10.6	10.1
	24-Apr-02	12.5	10.6	10.4	9.0	10.8
	26-Apr-02	10.8	9.2	10.0	9.0	10.8
May-02	20-May-02	10.5	10.5	10.1	9.6	9.4
	22-May-02	11.7	9.8	10.1	8.0	10.2
	24-May-02	11.0	8.6	9.3	7.7	9.7
Jun-02	24-Jun-02	12.0	9.1	9.5	7.5	8.6
	26-Jun-02	11.3	10.7	9.9	7.7	8.3
	28-Jun-02	11.6	10.0	10.4	7.8	9.4
Jul-02	22-Jul-02	10.7	10.2	9.6	9.4	9.0
	24-Jul-02	10.3	8.4	8.6	7.4	7.9
	26-Jul-02	9.6	7.8	8.0	7.0	7.7
Aug-02	19-Aug-02	11.2	9.2	9.1	9.2	8.5
	21-Aug-02	10.3	8.5	9.3	7.9	9.1
	23-Aug-02	10.5	9.0	9.0	8.8	8.8
Sep-02	23-Sep-02	9.8	6.0	6.7	8.4	8.3
	25-Sep-02	6.8	6.5	6.3	7.4	7.9
	27-Sep-02	8.5	6.6	7.5	8.5	8.4
Oct-02	14-Oct-02	10.4	7.0	7.6	8.9	8.8
	16-Oct-02	11.3	8.5	8.0	8.5	8.7
	18-Oct-02	10.6	8.6	7.9	8.6	8.7
Nov-02	18-Nov-02	12.0	7.9	8.5	8.9	9.6
	20-Nov-02	12.2	7.8	8.1	9.2	9.5
	22-Nov-02	11.8	7.8	8.3	9.0	9.2
Dec-02	16-Dec-02	10.4	9.7	9.9	9.5	9.9
	17-Dec-02	11.5	9.8	9.8	10.3	10.8
	20-Dec-02	11.0	10.0	10.4	9.7	10.3

NA- Not Available

Table 15: pH of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				Delta-Mendota Canal
		Site B	Site C	Site D	Site F	
Oct-01	22-Oct-01	8.2	7.7	7.7	7.7	7.8
	24-Oct-01	8.1	7.8	7.8	7.8	7.9
	26-Oct-01	8.3	7.8	7.9	7.8	8.0
Nov-01	26-Nov-01	7.5	7.7	7.7	7.7	7.8
	28-Nov-01	7.9	8.0	8.0	8.0	8.1
	30-Nov-01	8.2	8.3	8.3	8.2	8.3
Dec-01	10-Dec-01	8.0	8.0	7.9	7.6	7.7
	12-Dec-01	7.9	7.9	7.9	7.6	7.7
	14-Dec-01	8.0	7.9	7.9	7.5	7.6
Jan-02	28-Jan-02	8.1	7.9	8.1	7.8	8.5
	30-Jan-02	7.9	8.0	7.9	7.7	7.8
	1-Feb-02	7.7	7.9	7.7	7.8	7.8
Feb-02	18-Feb-02	8.0	7.8	7.9	7.4	7.6
	20-Feb-02	7.9	8.0	8.0	7.8	7.9
	22-Feb-02	7.9	7.8	8.0	7.9	7.8
Mar-02	25-Mar-02	8.5	8.3	8.2	7.5	7.8
	27-Mar-02	8.5	8.2	8.2	7.9	8.1
	29-Mar-02	8.1	8.2	8.2	NA	6.5
Apr-02	22-Apr-02	8.2	7.9	7.8	8.2	7.9
	24-Apr-02	8.5	8.0	8.2	7.7	7.9
	26-Apr-02	8.3	7.8	8.1	7.6	8.0
May-02	20-May-02	8.3	8.0	8.1	7.8	7.9
	22-May-02	8.4	7.8	8.1	7.6	7.6
	24-May-02	8.1	8.1	8.3	7.9	8.0
Jun-02	24-Jun-02	8.5	8.4	8.4	7.9	8.0
	26-Jun-02	8.4	8.0	8.4	7.8	7.9
	28-Jun-02	8.4	8.2	8.5	7.8	7.9
Jul-02	22-Jul-02	8.2	7.8	8.3	7.7	7.8
	24-Jul-02	8.3	7.8	8.2	7.6	7.7
	26-Jul-02	8.3	7.9	8.3	7.5	7.7
Aug-02	19-Aug-02	8.4	8.0	8.3	7.7	7.7
	21-Aug-02	8.2	7.8	8.2	7.7	7.6
	23-Aug-02	8.3	8.0	8.2	7.7	7.6
Sep-02	23-Sep-02	8.3	7.4	7.5	7.5	7.2
	25-Sep-02	7.8	7.7	7.6	7.6	7.8
	27-Sep-02	8.0	7.9	7.8	7.5	7.5
Oct-02	14-Oct-02	8.8	7.3	7.8	7.6	7.4
	16-Oct-02	9.1	8.0	8.0	7.9	8.1
	18-Oct-02	9.0	8.0	7.9	7.8	8.0
Nov-02	18-Nov-02	8.3	7.8	7.8	7.6	7.5
	20-Nov-02	8.3	7.7	7.7	7.6	7.6
	22-Nov-02	8.3	7.7	7.7	7.6	7.7
Dec-02	16-Dec-02	8.0	8.0	8.0	7.4	8.0
	17-Dec-02	7.9	7.6	7.4	7.5	7.4
	20-Dec-02	7.9	8.0	8.0	7.4	8.0

NA-Not Available

Table 16: Salinity (ppt) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				Delta-Mendota Canal
		Site B	Site C	Site D	Site F	
Oct-01	22-Oct-01	2.4	0.7	0.9	0.9	0.3
	24-Oct-01	2.4	0.8	1.0	0.8	0.4
	26-Oct-01	2.1	0.8	1.0	0.9	0.3
Nov-01	26-Nov-01	2.2	0.8	1.0	0.8	0.3
	28-Nov-01	2.2	0.9	1.0	0.8	0.3
	30-Nov-01	2.3	0.8	1.0	0.7	0.4
Dec-01	10-Dec-01	2.2	0.8	1.1	0.7	0.3
	12-Dec-01	2.2	0.8	1.1	0.7	0.3
	12/14/200	2.1	1.0	1.2	1.0	0.3
Jan-02	28-Jan-02	2.2	0.7	1.5	0.1	0.1
	30-Jan-02	2.7	2.6	1.6	1.1	0.2
	1-Feb-02	2.7	1.2	1.6	0.9	0.1
Feb-02	18-Feb-02	2.4	1.2	0.8	0.8	0.5
	20-Feb-02	2.7	1.2	1.3	0.7	0.4
	22-Feb-02	2.7	0.7	1.7	0.4	0.8
Mar-02	25-Mar-02	2.5	1.5	1.5	0.9	0.5
	27-Mar-02	2.8	1.4	1.9	0.2	0.2
	29-Mar-02	2.5	1.4	1.8	NA	0.1
Apr-02	22-Apr-02	1.7	1.2	0.7	2.3	0.2
	24-Apr-02	2.8	0.8	1.8	0.9	0.2
	26-Apr-02	2.7	0.9	2.1	0.9	0.2
May-02	20-May-02	2.6	1.1	2.3	0.6	0.3
	22-May-02	2.1	0.9	1.8	0.5	0.3
	24-May-02	2.1	0.7	1.5	0.5	2.0
Jun-02	24-Jun-02	2.1	0.5	1.6	0.5	0.1
	26-Jun-02	2.0	0.7	1.9	0.5	0.1
	28-Jun-02	2.3	1.4	2.3	0.6	0.2
Jul-02	22-Jul-02	2.0	0.3	1.4	0.5	0.2
	24-Jul-02	1.9	0.5	1.2	0.5	0.2
	26-Jul-02	2.1	0.5	1.5	0.5	0.2
Aug-02	19-Aug-02	2.0	0.6	1.4	0.6	0.3
	21-Aug-02	1.8	0.6	1.4	0.6	0.3
	23-Aug-02	1.8	0.6	1.4	0.6	0.3
Sep-02	23-Sep-02	2.0	0.5	1.0	0.6	0.3
	25-Sep-02	2.3	0.5	1.0	0.7	0.3
	27-Sep-02	2.1	0.5	1.0	0.7	0.3
Oct-02	14-Oct-02	3.0	0.6	1.2	0.7	0.3
	16-Oct-02	2.3	0.5	0.7	0.7	0.3
	18-Oct-02	2.4	0.5	0.9	0.7	0.3
Nov-02	18-Nov-02	2.1	1.0	1.0	0.7	0.3
	20-Nov-02	2.5	0.8	1.0	0.7	0.3
	22-Nov-02	2.3	0.9	1.0	0.7	0.3
Dec-02	16-Dec-02	2.5	0.9	1.2	0.6	0.3
	17-Dec-02	2.5	0.8	1.1	0.7	0.3
	20-Dec-02	2.5	0.9	1.1	0.7	0.5

NA-Not Available

Table 17: Alkalinity (as mg/L CaCO₃) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				Delta-Mendota Canal
		Site B	Site C	Site D	Site F	
Oct-01	20-Oct-01	138	218	224	202	120
	22-Oct-01	188	256	222	220	114
	24-Oct-01	198	250	234	212	114
Nov-01	26-Nov-01	206	226	202	210	80
	28-Nov-01	240	110	224	194	114
	30-Nov-01	200	230	220	170	128
Dec-01	10-Dec-01	220	240	246	194	130
	12-Dec-01	200	230	240	342	120
	14-Dec-01	170	220	498	406	120
Jan-02	28-Jan-02	232	260	214	68	94
	30-Jan-02	192	198	280	226	86
	1-Feb-02	208	280	308	194	114
Feb-02	18-Feb-02	160	270	240	160	130
	20-Feb-02	200	300	276	180	130
	22-Feb-02	160	280	260	200	120
Mar-02	25-Mar-02	202	350	300	220	140
	27-Mar-02	180	330	220	100	90
	29-Mar-02	140	360	270	NA	88
Apr-02	22-Apr-02	110	260	140	160	100
	24-Apr-02	190	170	160	184	100
	26-Apr-02	182	220	200	200	124
May-02	20-May-02	140	220	200	140	90
	22-May-02	160	200	180	150	110
	24-May-02	170	170	170	160	140
Jun-02	24-Jun-02	150	140	150	150	100
	26-Jun-02	140	160	150	160	90
	28-Jun-02	140	220	140	160	80
Jul-02	22-Jul-02	128	128	124	130	66
	24-Jul-02	114	136	128	130	68
	26-Jul-02	110	130	126	124	64
Aug-02	19-Aug-02	154	136	146	126	66
	21-Aug-02	152	148	146	140	70
	23-Aug-02	178	150	160	150	76
Sep-02	23-Sep-02	130	150	150	146	80
	25-Sep-02	130	150	140	160	90
	27-Sep-02	140	170	170	160	80
Oct-02	14-Oct-02	100	180	158	152	80
	16-Oct-02	112	150	138	158	64
	18-Oct-02	136	182	156	154	96
Nov-02	18-Nov-02	184	228	216	160	88
	20-Nov-02	186	234	228	174	76
	22-Nov-02	192	230	226	168	78
Dec-02	16-Dec-02	180	216	222	130	86
	17-Dec-02	178	210	206	146	84
	20-Dec-02	182	212	206	144	120

NA-Not Available

Table 18: Hardness (as mg/L CaCO₃) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				
		Site B	Site C	Site D	Site F	Delta-Mendota Canal
Oct-01	20-Oct-01	1,082	94	396	332	174
	22-Oct-01	1,102	140	200	310	148
	24-Oct-01	1,010	352	452	364	204
Nov-01	26-Nov-01	994	364	416	208	172
	28-Nov-01	1,050	304	304	342	190
	30-Nov-01	1,230	400	460	370	200
	10-Dec-01	1,088	362	470	308	164
Dec-01	12-Dec-01	846	525	490	360	182
	14-Dec-01	1,058	332	524	428	152
	28-Jan-02	1,000	240	600	140	120
Jan-02	30-Jan-02	1,266	1,230	490	444	148
	1-Feb-02	1,248	496	304	396	162
	18-Feb-02	201	510	650	360	240
Feb-02	20-Feb-02	220	240	540	300	200
	22-Feb-02	200	460	680	360	204
	25-Mar-02	700	170	750	330	244
Mar-02	27-Mar-02	300	280	400	180	190
	29-Mar-02	240	400	600	NA	240
	22-Apr-02	200	400	350	220	160
Apr-02	24-Apr-02	200	400	400	260	150
	26-Apr-02	250	230	370	160	150
	20-May-02	180	360	600	200	400
May-02	22-May-02	200	330	400	400	500
	24-May-02	600	260	600	200	150
	24-Jun-02	920	210	300	204	90
Jun-02	26-Jun-02	900	400	250	260	110
	28-Jun-02	900	600	250	250	100
	22-Jul-02	800	194	604	198	100
Jul-02	24-Jul-02	804	196	490	216	84
	26-Jul-02	852	210	592	194	82
	19-Aug-02	736	202	568	206	88
Aug-02	21-Aug-02	760	212	602	224	92
	23-Aug-02	920	164	390	220	74
	23-Sep-02	816	190	388	240	130
Sep-02	25-Sep-02	220	120	400	240	110
	27-Sep-02	>1000	210	500	240	110
	14-Oct-02	>1000	240	460	240	100
Oct-02	16-Oct-02	920	190	266	260	114
	18-Oct-02	860	220	350	220	106
	18-Nov-02	840	296	366	254	116
Nov-02	20-Nov-02	>1000	294	372	264	98
	22-Nov-02	>1000	294	374	252	98
	16-Dec-02	>1000	308	472	198	116
Dec-02	17-Dec-02	>1000	262	392	464	128
	20-Dec-02	>1000	292	406	256	198

NA-Not Available

Table 19: Temperature (⁰c) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				Delta-Mendota Canal
		Site B	Site C	Site D	Site F	
Oct-01	20-Oct-01	2.5	2.5	2.5	2.5	2.0
	22-Oct-01	6.0	6.0	6.0	6.0	6.0
	24-Oct-01	7.5	4.9	5.2	4.8	4.8
Nov-01	26-Nov-01	3.8	3.8	3.6	3.5	3.3
	28-Nov-01	3.8	3.8	3.8	3.8	3.8
	30-Nov-01	3.8	3.5	3.4	3.4	3.4
Dec-01	10-Dec-01	3.0	3.0	3.0	3.0	3.0
	12-Dec-01	8.5	8.5	8.5	8.5	8.5
	14-Dec-01	2.9	2.6	3.8	2.4	3.7
Jan-02	28-Jan-02	4.2	5.0	4.1	4.3	4.0
	30-Jan-02	3.4	3.2	3.8	3.4	5.2
	1-Feb-02	2.8	8.0	3.7	4.7	3.7
Feb-02	18-Feb-02	2.7	12.9	2.7	2.7	3.9
	20-Feb-02	3.8	2.7	4.6	4.1	6.9
	22-Feb-02	4.3	4.7	9.7	5.9	8.3
Mar-02	25-Mar-02	9.0	3.0	3.8	14.0	7.0
	27-Mar-02	14.2	9.8	4.7	8.0	3.8
	29-Mar-02	3.0	7.9	9.0	NA	5.0
Apr-02	22-Apr-02	8.0	8.0	8.0	8.0	8.0
	24-Apr-02	4.0	4.0	4.0	4.0	4.0
	26-Apr-02	4.0	3.5	3.5	3.1	5.0
May-02	20-May-02	8.1	7.7	8.6	7.2	7.6
	22-May-02	3.0	3.5	4.0	5.1	5.0
	24-May-02	15.9	15.4	15.1	15.3	18.1
Jun-02	24-Jun-02	20.7	20.1	20.8	19.7	21.2
	26-Jun-02	9.5	9.5	9.5	9.5	9.5
	28-Jun-02	12.5	12.5	12.5	12.5	12.5
Jul-02	22-Jul-02	8.0	8.0	8.0	8.0	8.0
	24-Jul-02	6.0	5.8	6.0	6.5	13.5
	26-Jul-02	16.0	16.5	16.0	16.5	17.0
Aug-02	19-Aug-02	6.0	6.0	6.0	6.0	6.0
	21-Aug-02	9.5	9.5	9.5	9.5	9.5
	23-Aug-02	4.0	4.0	4.0	4.0	4.0
Sep-02	23-Sep-02	7.5	3.5	4.5	8.0	4.5
	25-Sep-02	5.2	5.2	5.2	5.2	5.2
	27-Sep-02	4.5	4.5	4.5	4.5	4.5
Oct-02	14-Oct-02	0.7	1.0	0.7	5.0	1.0
	16-Oct-02	3.0	3.0	3.0	3.0	3.0
	18-Oct-02	4.0	4.0	4.0	4.0	4.0
Nov-02	18-Nov-02	2.0	1.5	1.0	1.0	6.0
	20-Nov-02	2.5	2.5	2.5	2.5	2.5
	22-Nov-02	4.6	4.6	4.6	4.6	4.6
Dec-02	16-Dec-02	1.0	1.0	1.0	4.0	1.0
	17-Dec-02	1.5	2.0	1.5	2.5	2.0
	20-Dec-02	1.0	0.5	0.5	4.0	0.8

NA-Not Available

Table 20: Ammonia (ppm as Nitrogen) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				Delta-Mendota Canal
		Site B	Site C	Site D	Site F	
Oct-01	20-Oct-01	0.20	0.50	0.20	0.30	0.40
	22-Oct-01	3.30	0.30	0.40	0.40	0.30
	24-Oct-01	3.80	0.40	0.40	0.30	0.20
Nov-01	26-Nov-01	1.80	0.60	0.50	0.30	0.40
	28-Nov-01	1.00	0.40	0.40	0.50	0.40
	30-Nov-01	0.90	0.40	0.40	0.40	0.60
Dec-01	10-Dec-01	0.20	0.30	0.30	0.30	0.30
	12-Dec-01	0.20	0.20	0.40	0.30	0.40
	14-Dec-01	0.20	0.40	0.60	0.40	0.30
Jan-02	28-Jan-02	0.20	0.20	0.20	0.30	0.30
	30-Jan-02	0.10	0.30	0.40	0.30	0.30
	1-Feb-02	0.20	0.30	0.20	0.20	4.00
Feb-02	18-Feb-02	0.40	0.40	0.10	0.70	0.50
	20-Feb-02	0.20	0.60	0.40	0.60	0.50
	22-Feb-02	0.30	0.70	0.70	0.60	0.50
Mar-02	25-Mar-02	0.16	0.18	0.20	0.18	0.28
	27-Mar-02	0.13	0.13	0.18	0.16	0.18
	29-Mar-02	0.13	0.20	0.23	NA	0.23
Apr-02	22-Apr-02	0.18	0.23	0.16	0.36	0.20
	24-Apr-02	0.40	0.38	0.23	0.38	0.10
	26-Apr-02	1.50	0.38	0.20	0.10	0.36
May-02	20-May-02	0.23	0.23	0.33	0.60	0.20
	22-May-02	0.20	0.30	0.18	0.28	0.13
	24-May-02	0.96	1.48	1.60	1.50	0.36
Jun-02	24-Jun-02	0.48	0.43	0.36	1.43	0.38
	26-Jun-02	0.43	0.43	0.56	0.73	0.36
	28-Jun-02	0.38	0.36	0.36	0.60	0.30
Jul-02	22-Jul-02	0.30	0.56	0.26	0.86	0.23
	24-Jul-02	0.23	0.56	0.26	0.63	0.28
	26-Jul-02	0.36	0.58	0.46	<0.10	0.38
Aug-02	19-Aug-02	0.33	0.43	0.40	0.90	0.48
	21-Aug-02	1.30	0.36	0.26	0.43	0.40
	23-Aug-02	0.46	0.58	0.40	0.58	0.48
Sep-02	23-Sep-02	0.28	0.36	0.28	0.30	0.20
	25-Sep-02	0.48	0.38	0.33	0.28	0.26
	27-Sep-02	0.53	0.28	0.38	0.28	0.33
Oct-02	14-Oct-02	0.40	0.36	0.23	0.33	0.30
	16-Oct-02	0.36	0.33	0.28	0.46	0.36
	18-Oct-02	0.36	0.38	0.33	0.48	0.38
Nov-02	18-Nov-02	0.38	0.60	1.08	0.46	0.70
	20-Nov-02	0.28	0.30	0.38	0.43	0.53
	22-Nov-02	0.38	0.60	0.53	0.53	0.53
Dec-02	16-Dec-02	0.48	0.53	0.48	0.43	0.60
	17-Dec-02	0.40	0.48	0.58	0.58	0.60
	20-Dec-02	0.43	0.33	0.46	0.33	0.36

NA-Not Available

Table 21: Total Chlorine (mg/L) of Site Waters as Received at the BES Laboratory

MONTH	SAMPLE DATE	SITE LOCATION				
		Site B	Site C	Site D	Site F	Delta-Mendota Canal
Oct-01	20-Oct-01	0.60	0.10	0.20	0.20	0.10
	22-Oct-01	0.30	0.30	0.20	0.40	<0.10
	24-Oct-01	0.10	0.10	0.20	0.30	0.10
	26-Nov-01	0.10	0.10	0.10	<0.10	<0.10
Nov-01	28-Nov-01	0.10	0.20	0.30	<0.10	0.10
	30-Nov-01	<0.10	<0.10	0.10	<0.10	<0.10
	10-Dec-01	0.20	0.20	0.10	0.20	0.10
Dec-01	12-Dec-01	0.20	0.20	0.20	0.20	<0.10
	14-Dec-01	0.20	0.10	0.20	0.20	0.10
	28-Jan-02	0.10	0.20	0.10	0.10	0.10
Jan-02	30-Jan-02	0.20	0.20	0.30	0.30	0.20
	1-Feb-02	0.20	0.20	0.10	0.20	0.20
	18-Feb-02	0.30	0.20	0.30	<0.10	0.30
Feb-02	20-Feb-02	0.20	0.20	0.20	<0.10	0.10
	22-Feb-02	0.10	0.20	0.10	0.10	0.30
	25-Mar-02	0.40	0.20	0.20	0.20	0.20
Mar-02	27-Mar-02	0.10	0.50	0.40	0.10	<0.10
	29-Mar-02	0.10	0.20	0.30	NA	0.20
	22-Apr-02	0.10	0.10	0.20	0.10	<0.10
Apr-02	24-Apr-02	0.20	0.10	0.10	0.10	0.10
	26-Apr-02	0.20	0.20	0.30	0.10	0.10
	20-May-02	0.73	0.23	0.26	0.23	0.10
May-02	22-May-02	0.28	0.16	0.33	0.10	<0.10
	24-May-02	0.16	0.16	<0.10	<0.10	<0.10
	24-Jun-02	<0.10	<0.10	<0.10	<0.10	<0.10
Jun-02	26-Jun-02	<0.10	0.58	<0.10	1.05	0.40
	28-Jun-02	0.13	0.10	0.18	0.15	0.13
	22-Jul-02	<0.10	0.13	<0.10	0.10	0.10
Jul-02	24-Jul-02	0.18	<0.10	0.10	<0.10	<0.10
	26-Jul-02	0.10	0.16	0.10	<0.10	<0.10
	19-Aug-02	2.50	0.20	0.50	0.20	<0.10
Aug-02	21-Aug-02	1.20	0.16	0.53	0.13	0.13
	23-Aug-02	0.26	0.10	0.18	0.18	<0.1
	23-Sep-02	0.90	0.33	0.40	0.26	0.20
Sep-02	25-Sep-02	0.26	0.43	0.30	<0.10	<0.10
	27-Sep-02	0.60	<0.10	0.38	0.20	0.10
	14-Oct-02	0.38	0.40	0.36	0.30	0.16
Oct-02	16-Oct-02	0.68	0.56	0.56	0.53	0.16
	18-Oct-02	0.56	0.36	0.53	0.28	0.16
	18-Nov-02	0.48	0.13	0.10	0.33	0.13
Nov-02	20-Nov-02	0.10	<0.10	<0.10	<0.10	<0.10
	22-Nov-02	0.13	<0.10	<0.10	0.18	<0.10
	16-Dec-02	<0.10	0.50	0.65	0.38	0.30
Dec-02	17-Dec-02	0.30	0.46	0.36	0.83	0.38
	20-Dec-02	0.10	<0.10	0.18	<0.10	<0.10

NA-Not Available

Site B

Figure 1. Site B Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Acute Survival (data from Table 1)

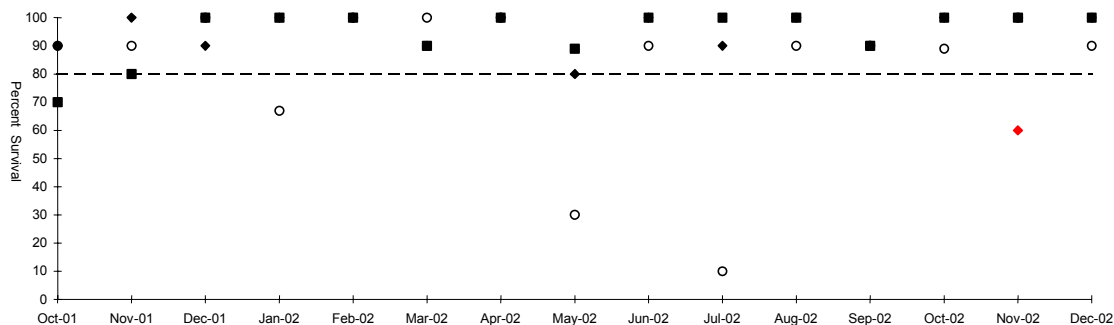


Figure 2. Site B Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Acute Larval Survival (data from Table 2)

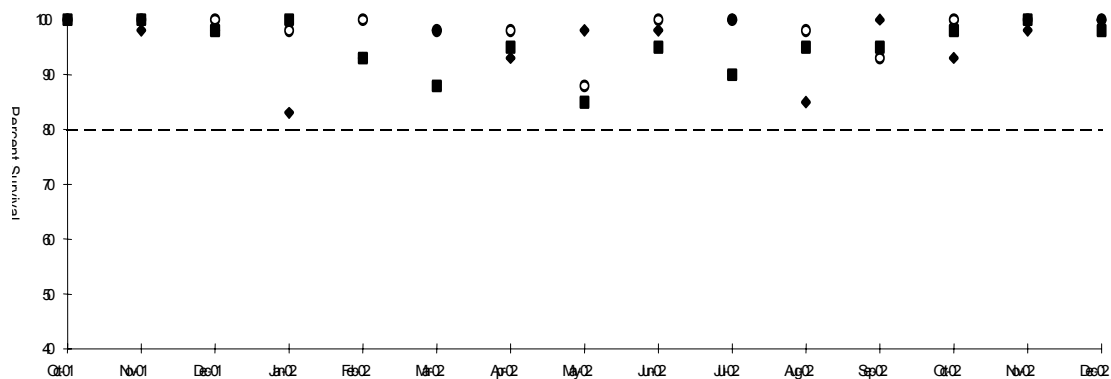


Figure 3. Site B Compared to Delta-Mendota Canal - *Daphnia magna* Short-Term Chronic Reproduction (Data from Table 3)

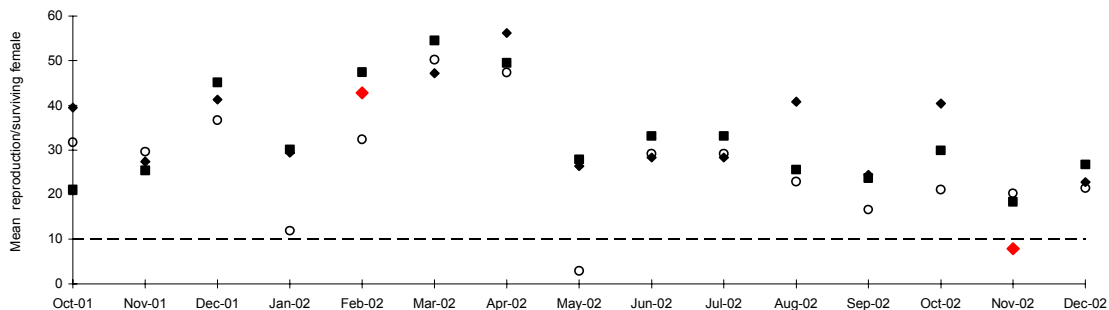


Figure 4. Site B Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Chronic Larval Growth (data from Table 4)

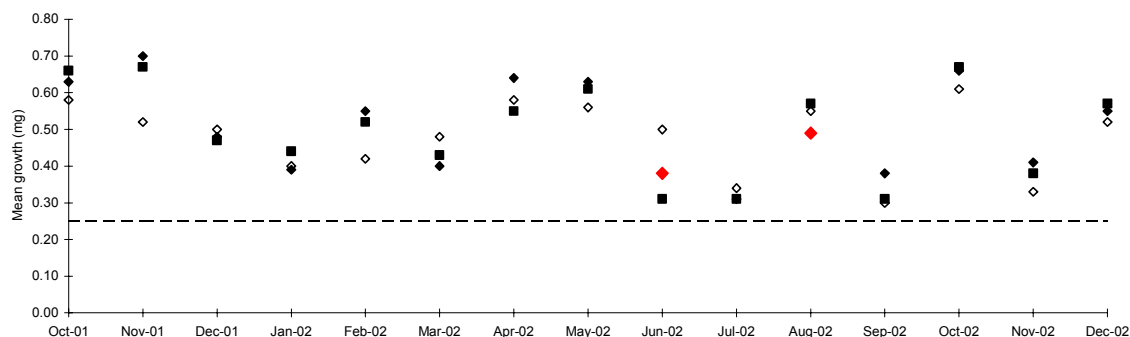
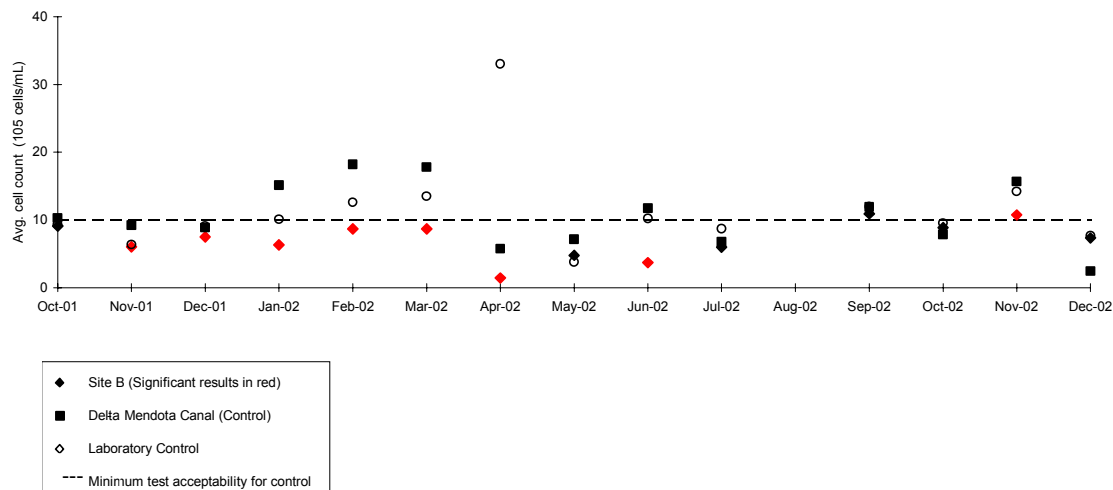


Figure 5. Site B Compared to Delta-Mendota Canal - *Selenastrum capricornutum* 96-hour Growth Tests (data from Table 5)



Site C

Figure 6. Site C Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Acute Survival (data from Table 1)

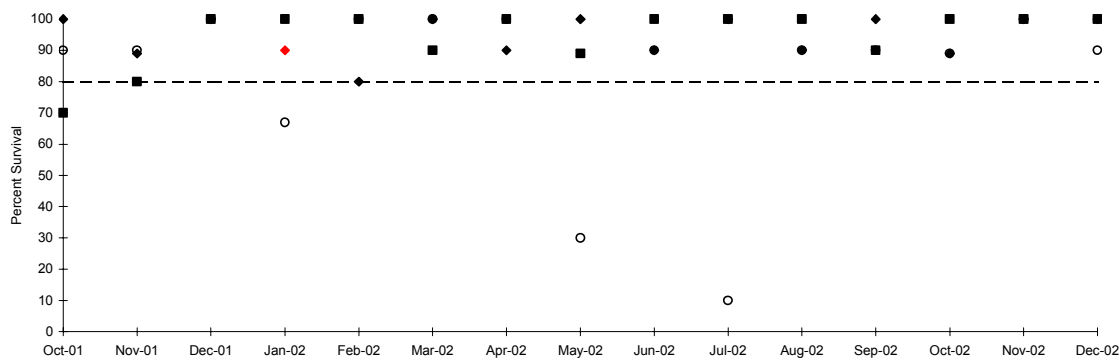


Figure 7. Site C Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Acute Larval Survival (data from Table 2)

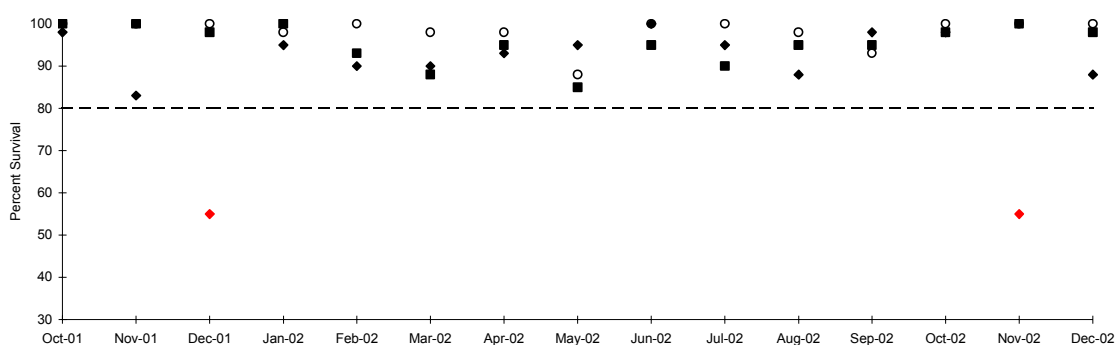


Figure 8. Site C Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Chronic Reproduction (data from Table 3)

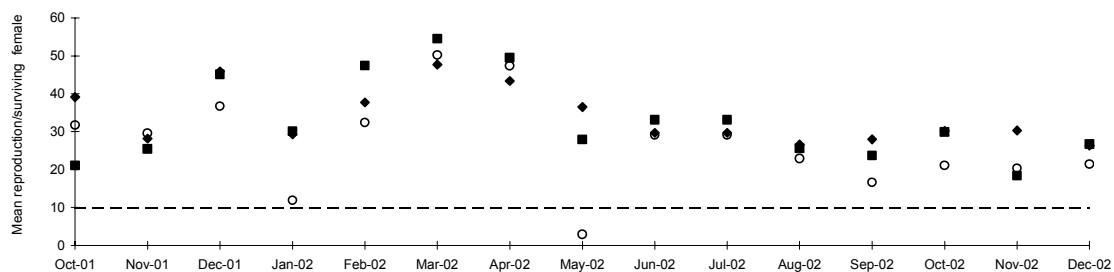


Figure 9. Site C Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Chronic Larval Growth (data from Table 4)

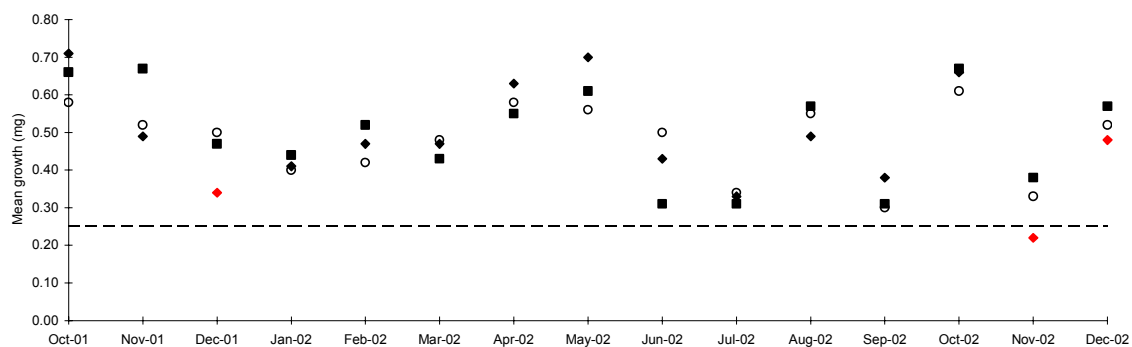
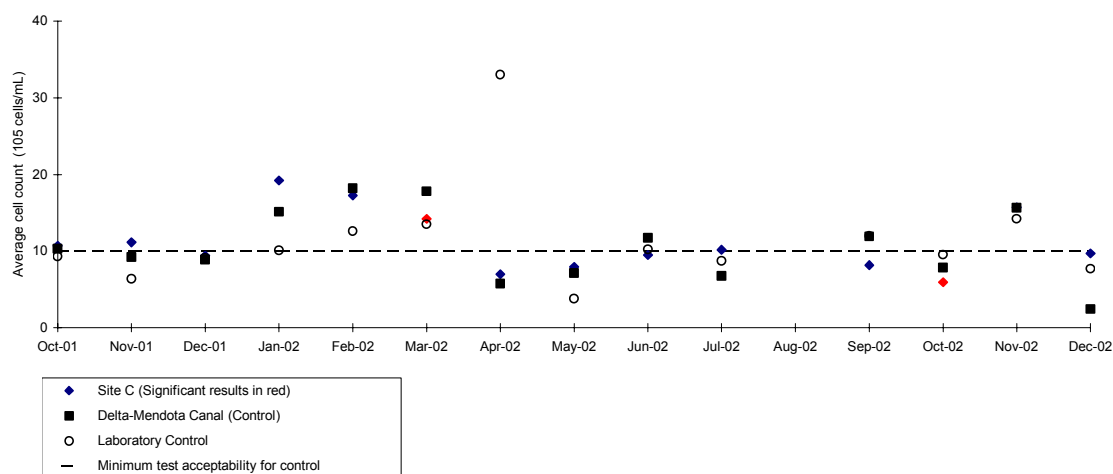


Figure 10. Site C Compared to Delta-Mendota Canal - *Selenastrum capricornutum* 96-hour Growth Tests (data from Table 5)



Site D

Figure 11. Site D Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Acute Survival (data from Table 1)

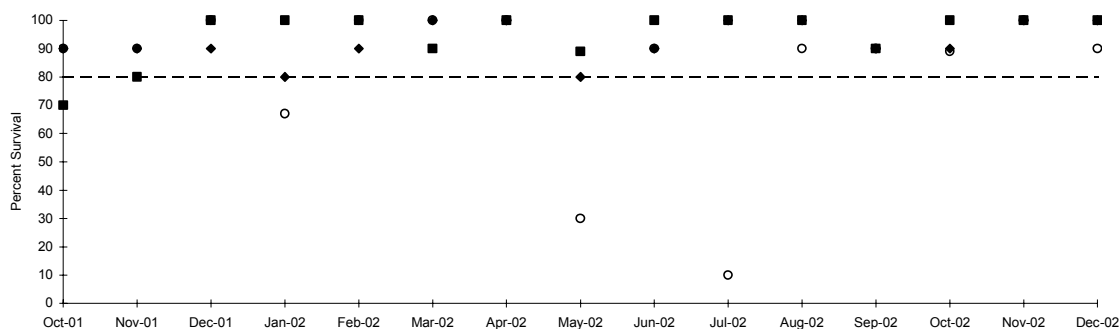


Figure 12. Site D Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Acute Larval Survival (data from Table 2)

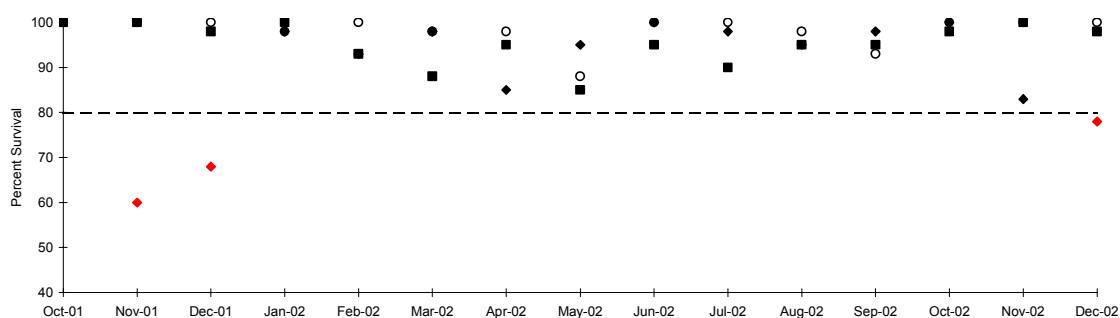


Figure 13. Site D Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Chronic Reproduction (data from Table 3)

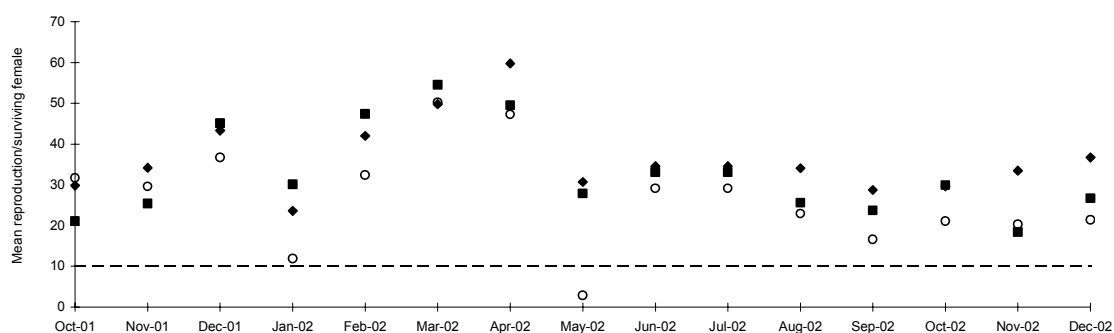


Figure 14. Site D Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Chronic Larval Growth (data from Table 4)

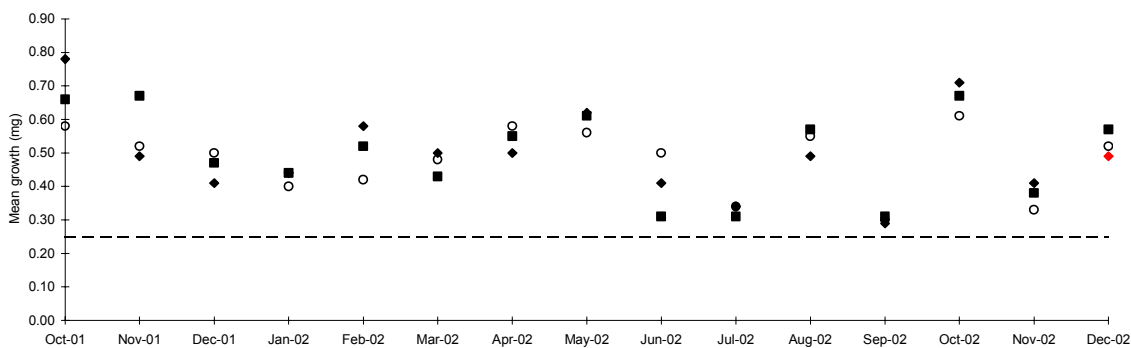
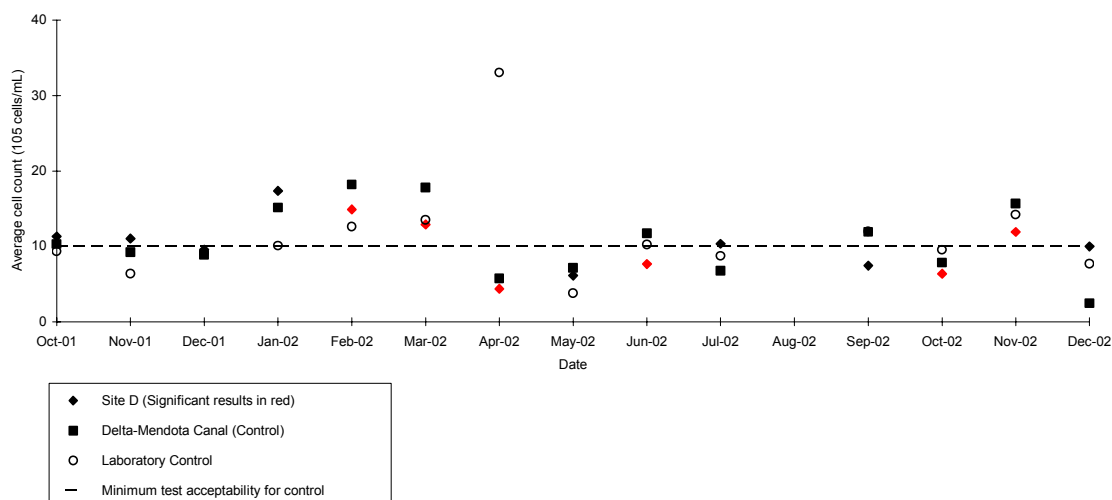


Figure 15. Site D Compared to Delta-Mendota Canal - *Selenastrum capricornutum* 96-hour Growth Tests (data from Table 5)



Site F

Figure 16. Site F Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Acute Survival (data from Table 1)

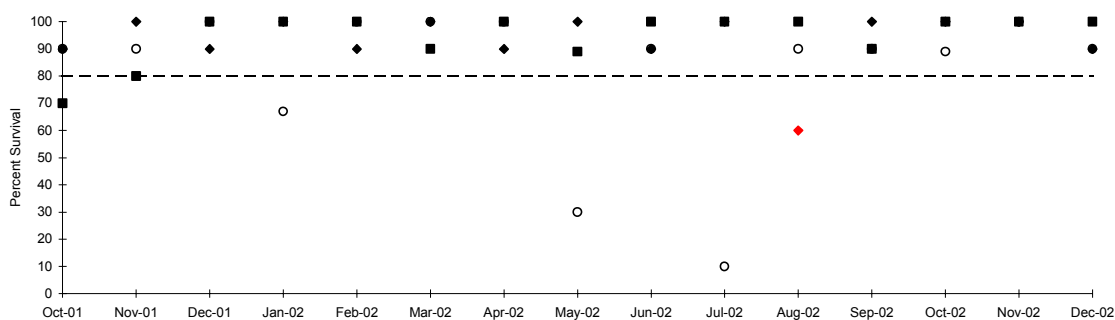


Figure 17. Site F Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Acute Larval Survival (data from Table 2)

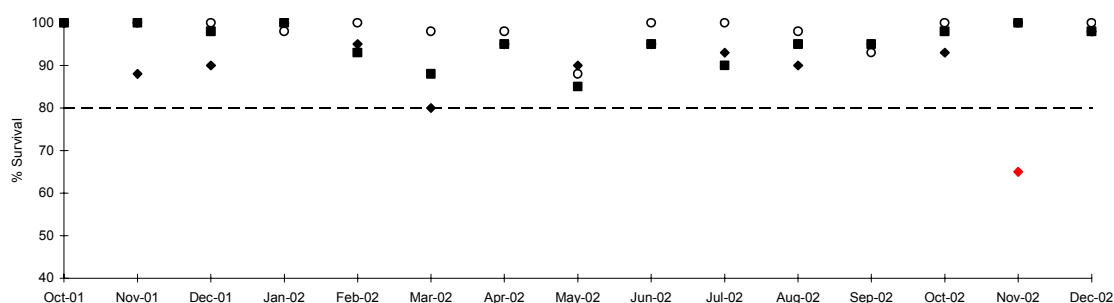


Figure 18. Site F Compared to Delta-Mendota Canal - *Daphnia magna* Short-term Chronic Reproduction (data from Table 3)

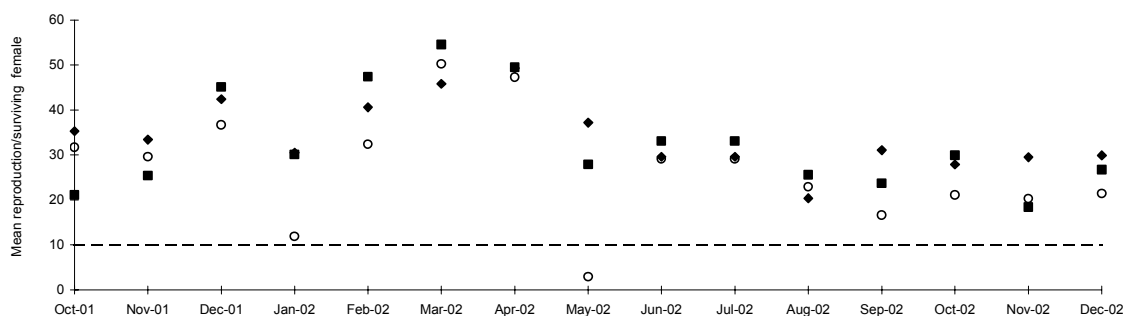


Figure 19. Site F Compared to Delta-Mendota Canal - *Pimephales promelas* 7-Day Chronic Larval Growth (data from Table 4)

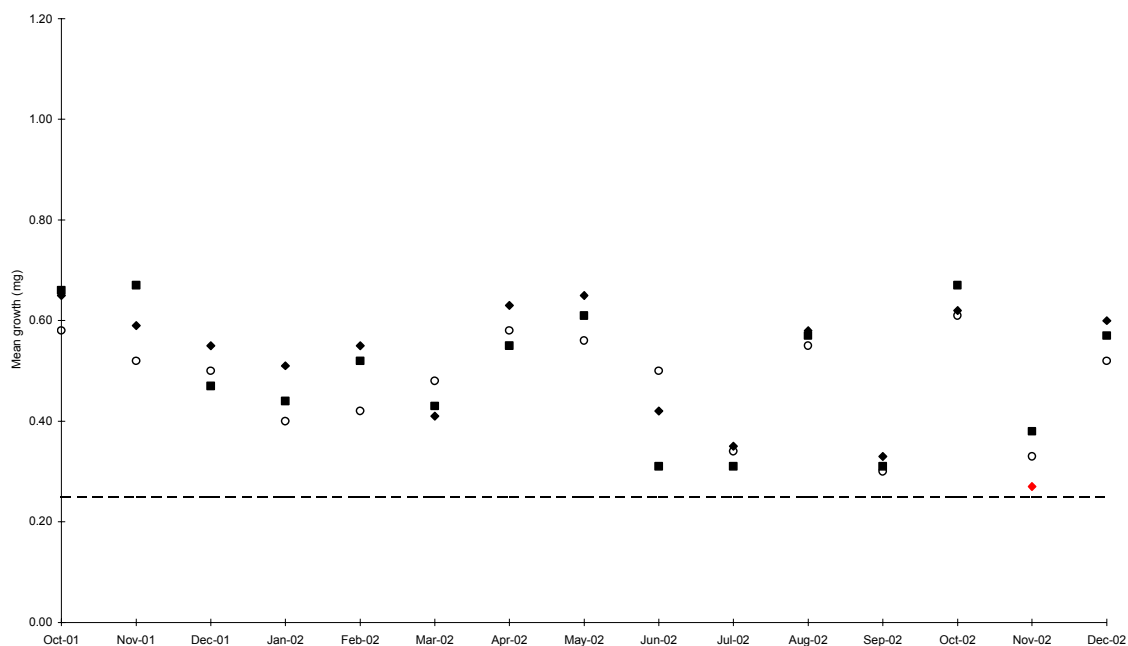


Figure 20. Site F Compared to Delta-Mendota Canal - *Selenastrum capricornutum* 96-hour Growth Tests (data from Table 5)

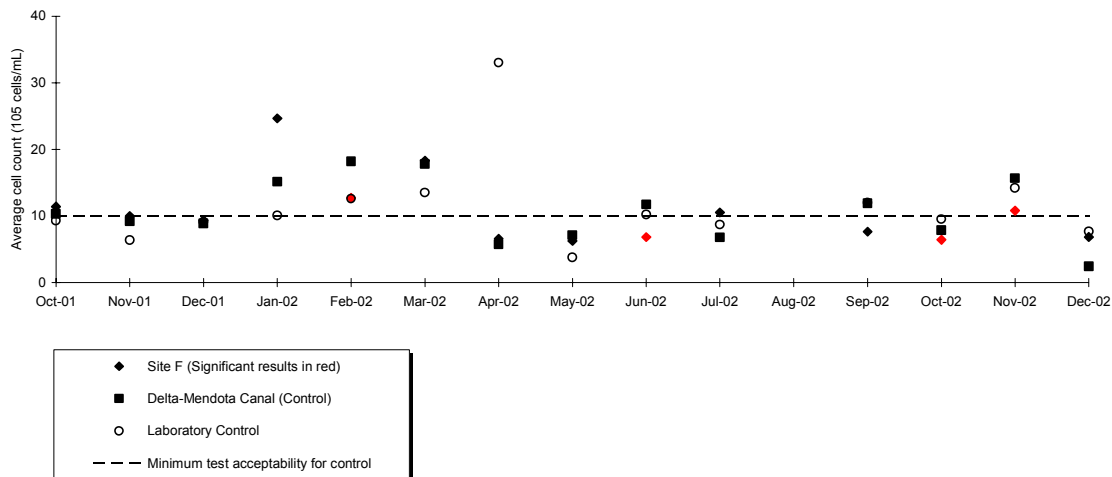


Figure 21a. Selenium Concentrations in San Luis Drain and Mud Slough

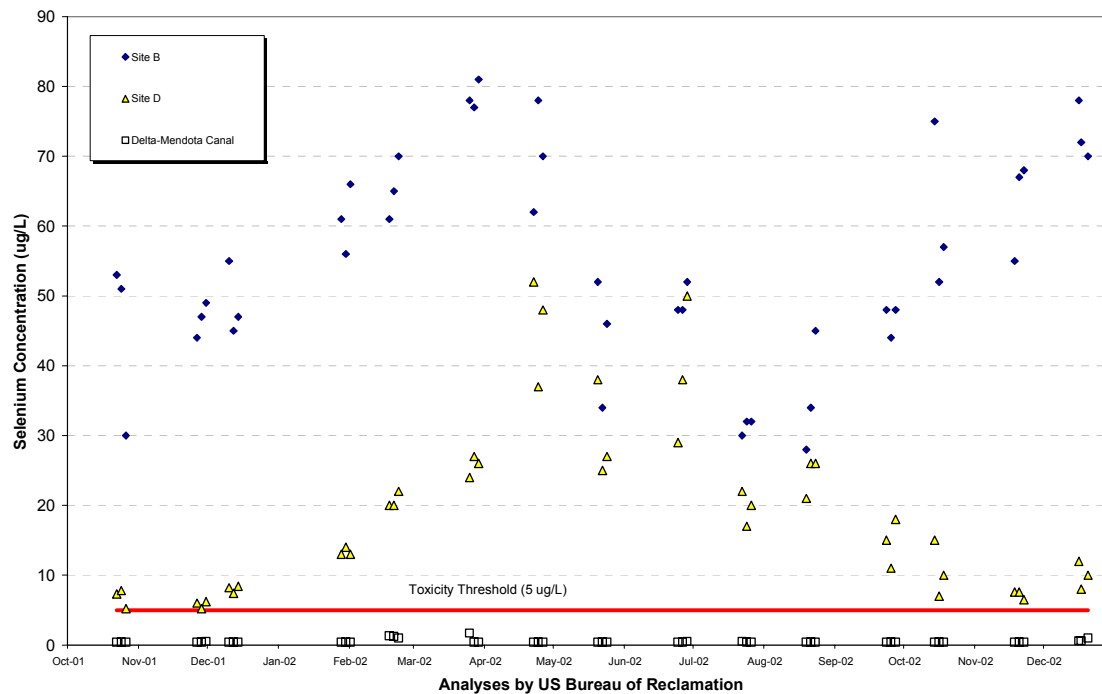


Figure 21b. Selenium Concentrations in Grassland Wetland Supply Channels

